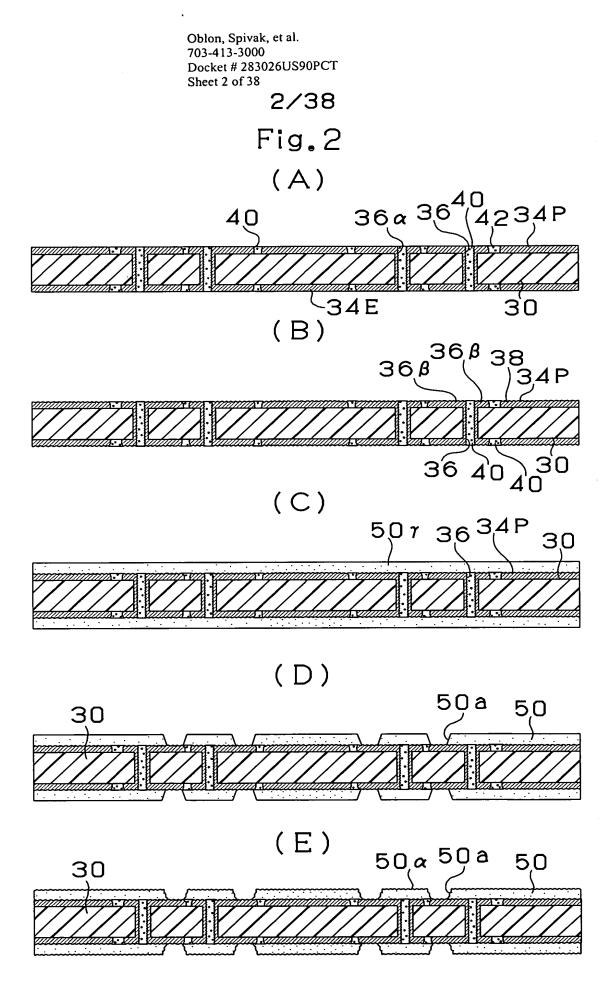
Oblon, Spivak, et al. 703-413-3000 Docket # 283026US90PCT Sheet 1 of 38 1/38 Fig. 1 (A) 3′5 3′0 (B) 34P 3,0 3,6 34E (C) 34 a 36,a (D) 30



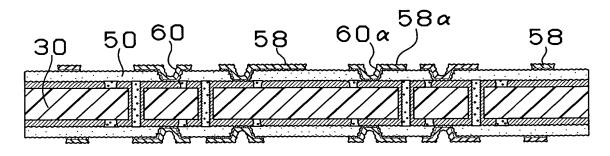
Oblon, Spivak, et al. 703-413-3000 Docket # 283026US90PCT Sheet 3 of 38 3/38 Fig.3 (A) 5,2 <sub>5,0</sub> 50,a 30 (B) 50 (C) 5,6 5,2 50 (D) 586,0 30 52,5,6 5,0 6,0

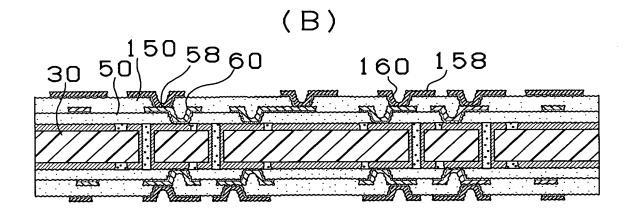
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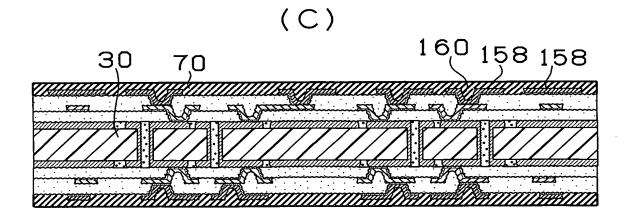
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Fig. 4

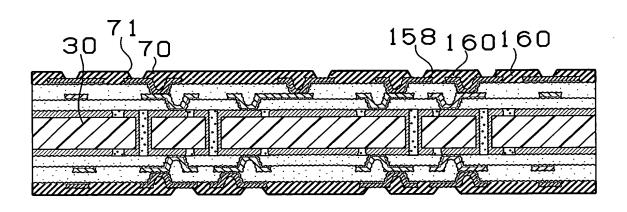
(A)



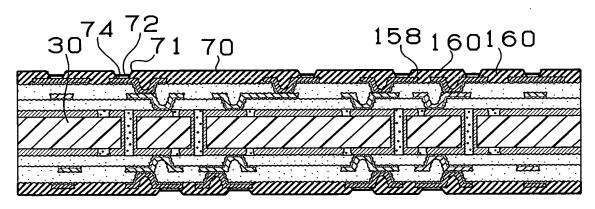


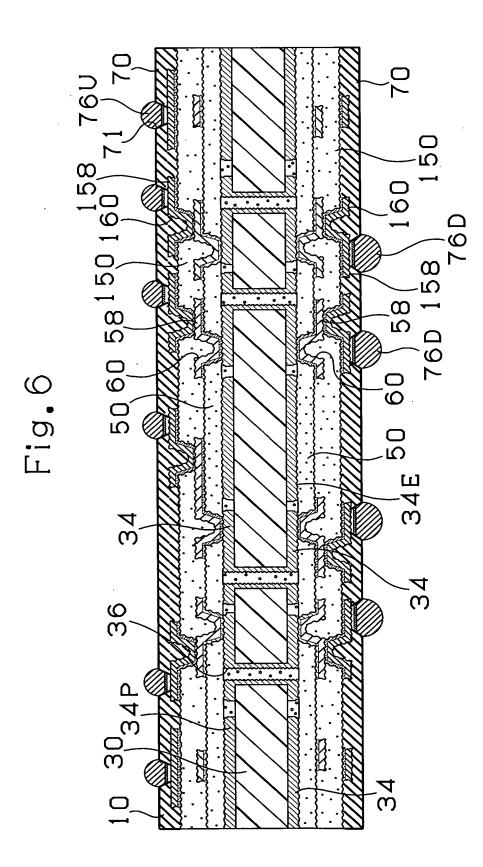


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Fig. 5
(A)

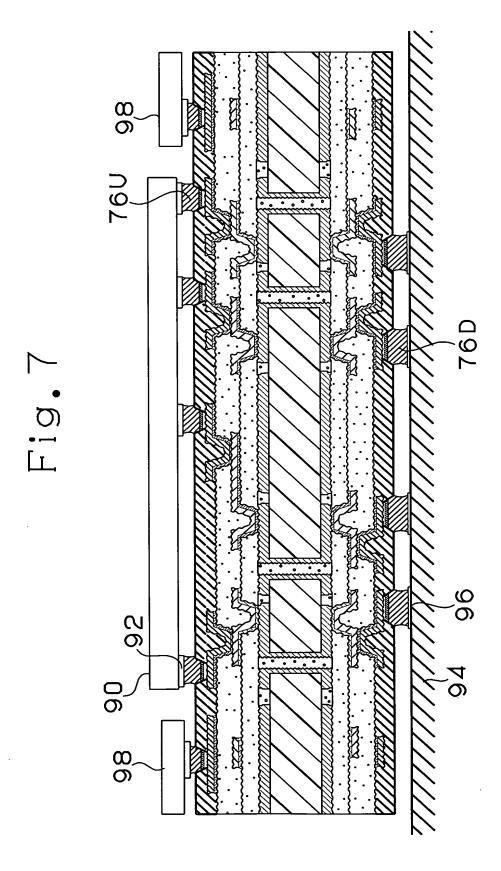


(B)

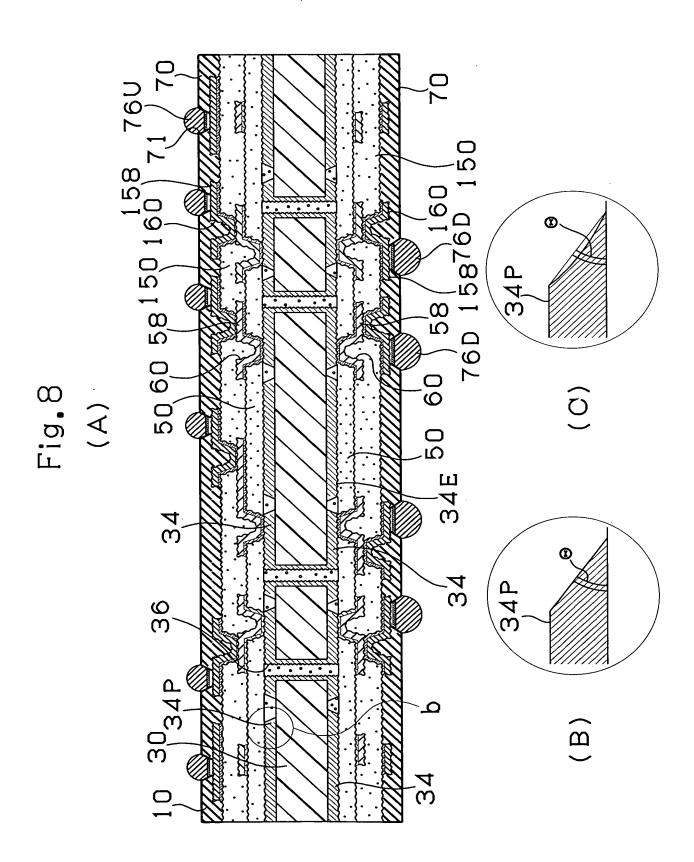




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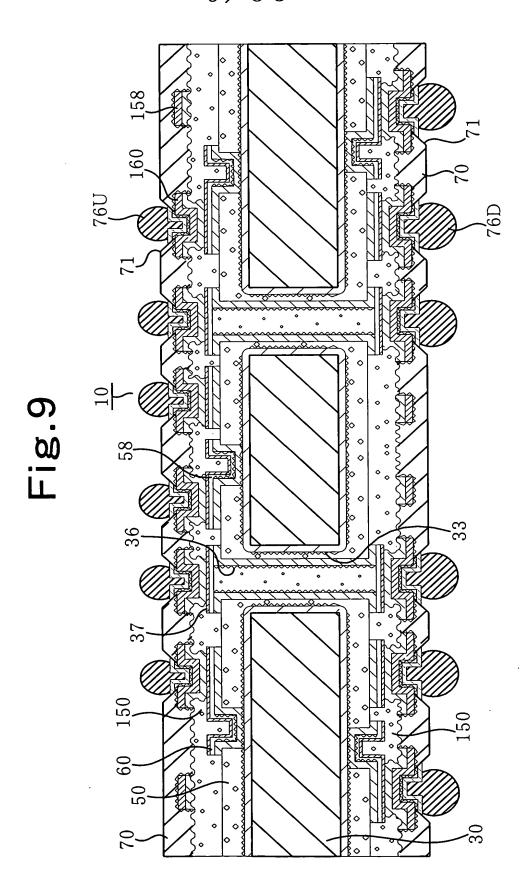
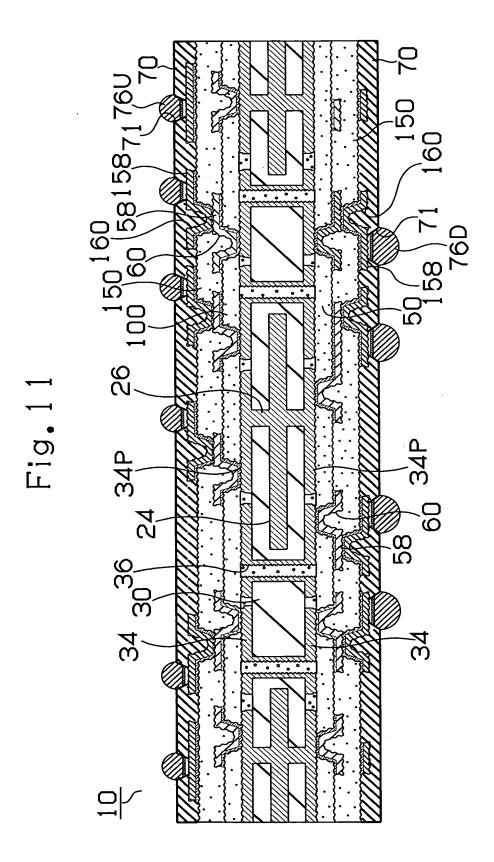
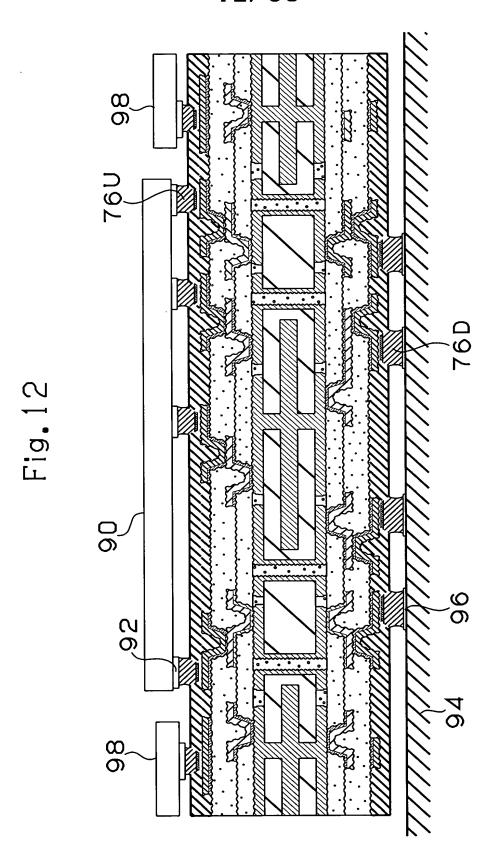
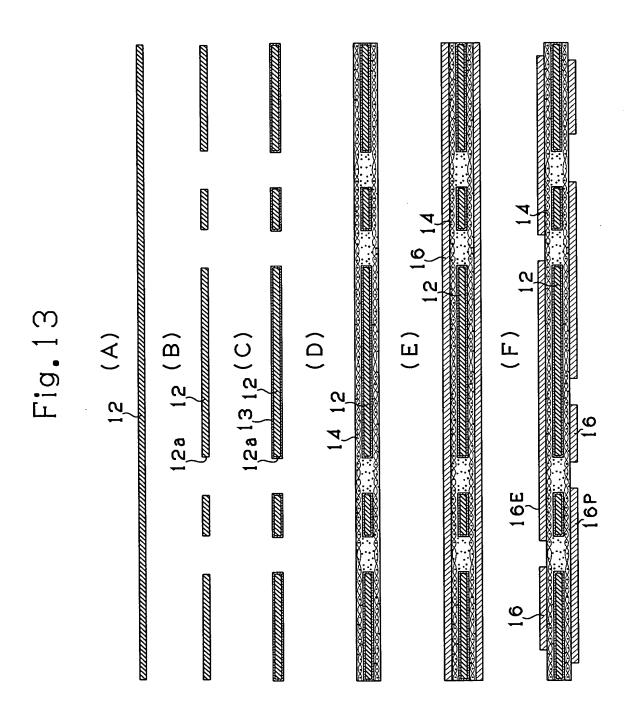


Fig.10



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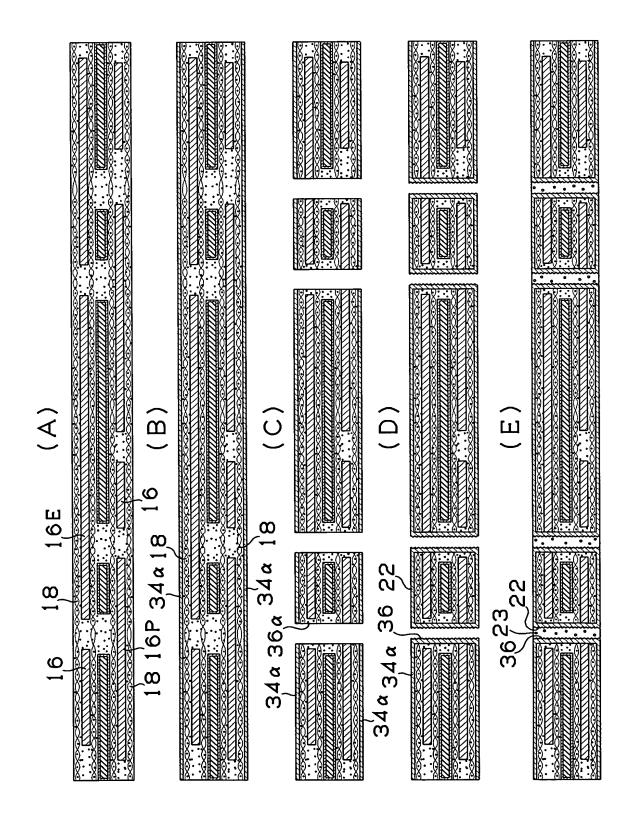
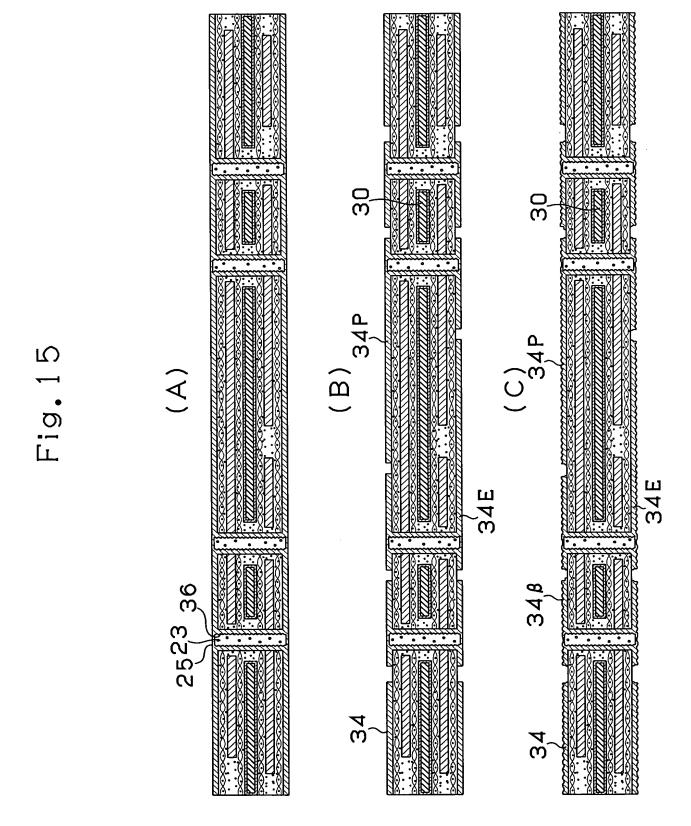
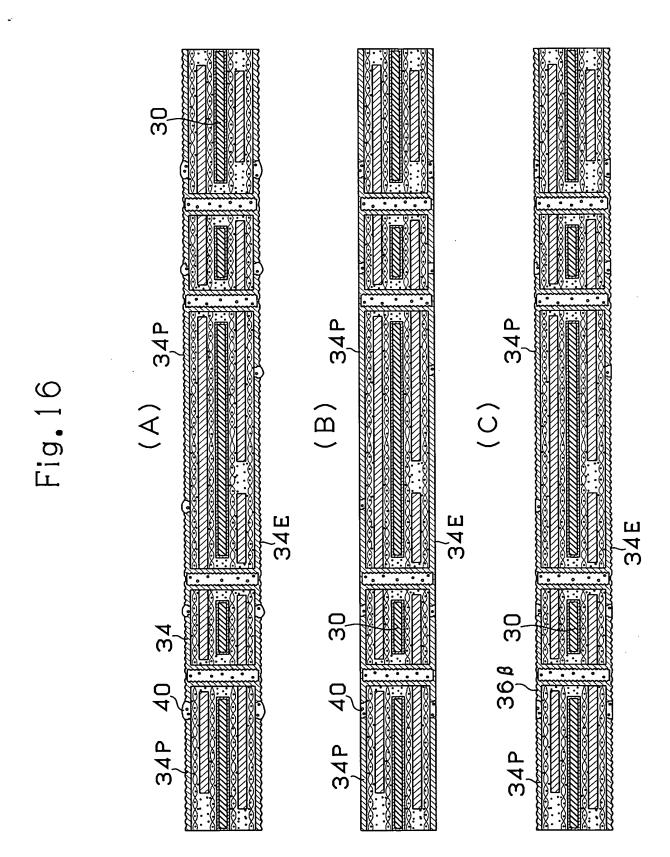
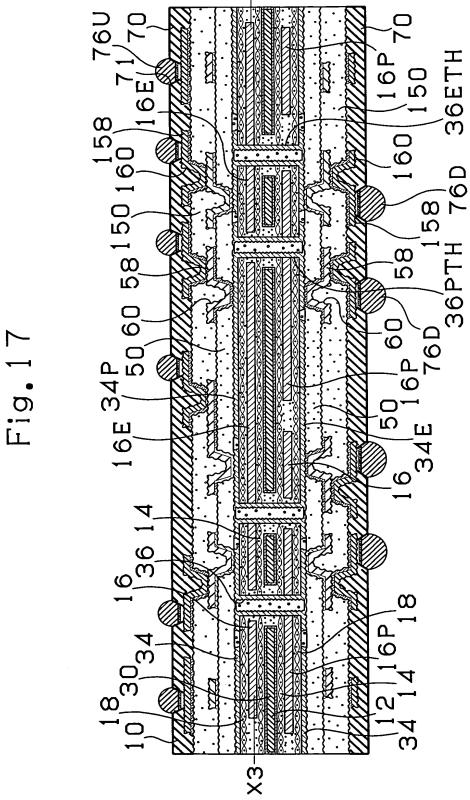


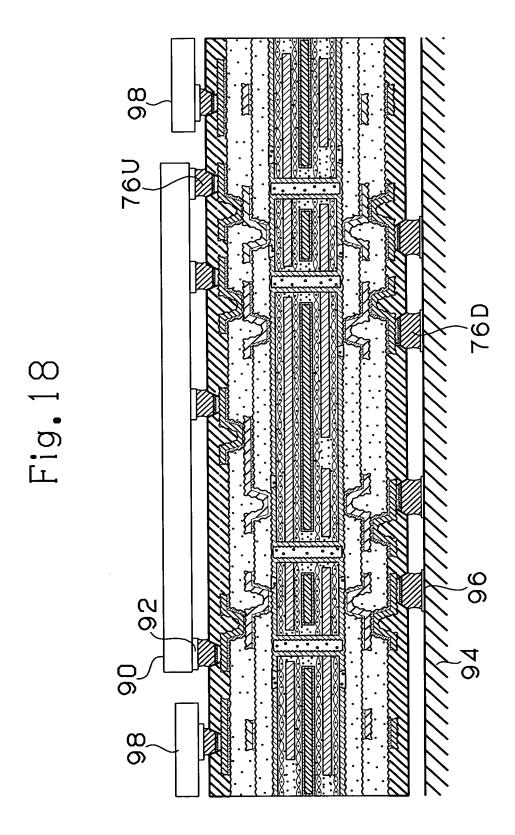
Fig. 14



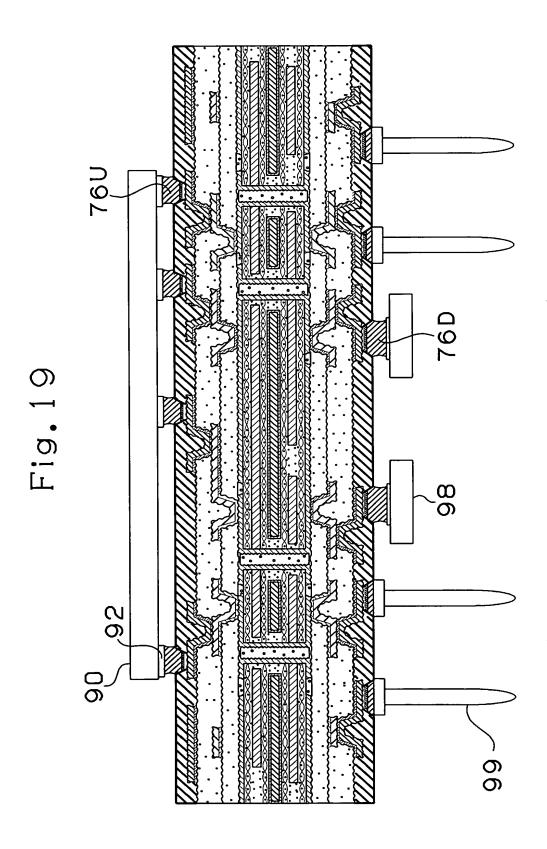




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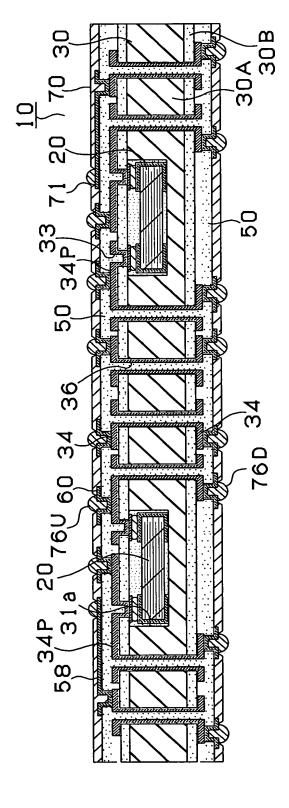
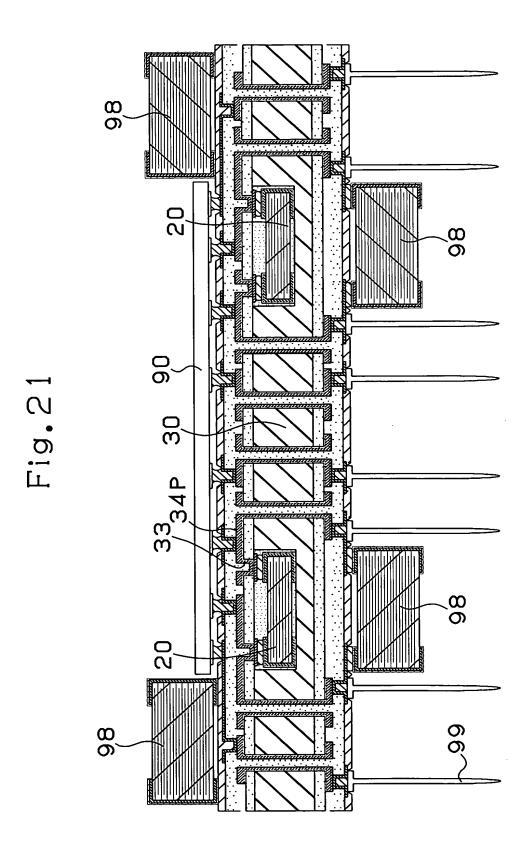
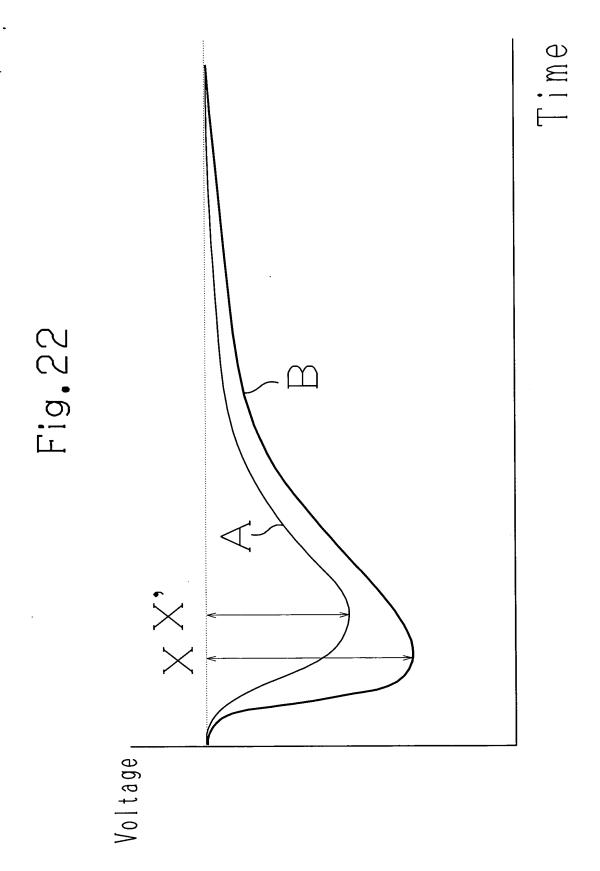


Fig. 20

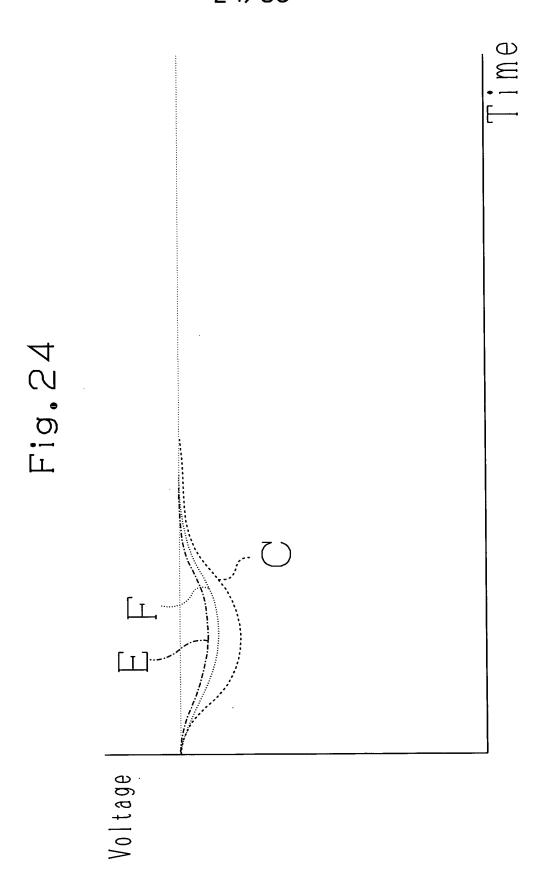
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Voltage

Fig.23

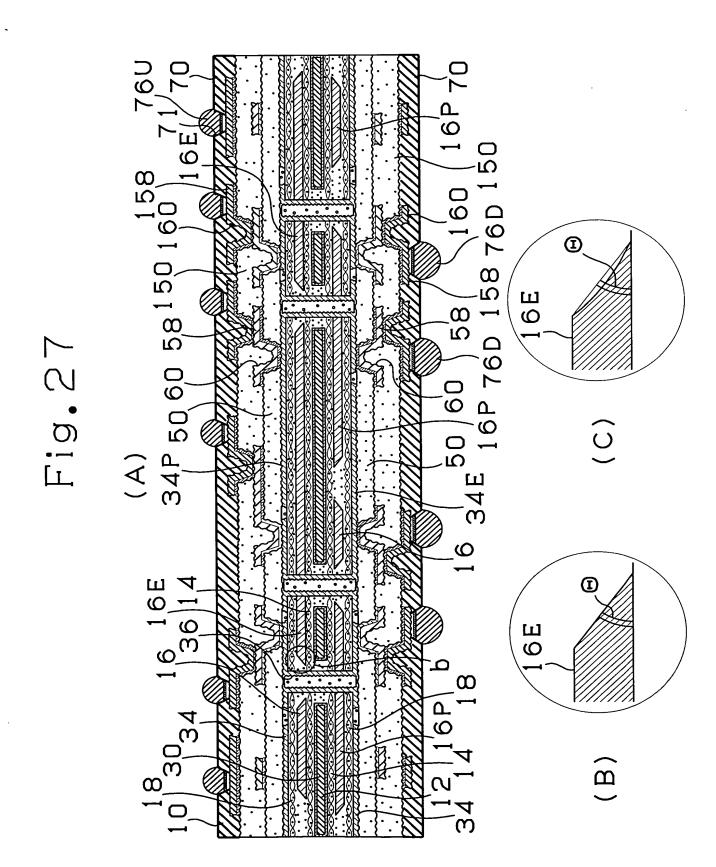


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Fig.

	Thickness Of Conductor Circuit	100hr	hr	300hr	Ohr	500hr	)hr	1000hr	Ohr	Amount Of Voltage Drop
	Ratio α1/α2	Presence /Absence Of IC Maffunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Voltage (V)
First Embodiment-1	20	0	0	0	0	0	0	0	0	0.091
First Embodiment -2	3.7	0	0	0	0	0	0	0	0	0.085
First Embodiment -3	5.0	0	0	0	0	0	0	0	0	0.085
First Embodiment4	30.0	0	0	0	0	0	0	0	0	0.093
First Embodiment5	1.2	0	0	0	0	0	0	0	0	0.093
Second Embodiment -1	20	0	0	0	0	0	0	0	0	0.091
Second Embodiment -2	3.3	0	0	0	0	0	0	0	0	0.085
Second Embodiment -3	5.0	0	0	0	0	0	0	0	0	0.085
Second Embodiment -4	30.0	0	0	0	0	0	0	0	0	0.094
Third Embodiment -1	23	0	0	0	0	0	0	0	0	0.087
Third Embodiment -2	3.7	0	0	0	0	0	0	0	0	0.085
Third Embodiment -3	10.0	0	0	0	0	0	0	0	0	0.093
Third Embodiment -4	30.0	0	0	0	0	0	0	0	0	0.093
Third Embodiment5	40.0	0	0	0	0	0	0	0	0	960'0
Fourth Embodiment -1	3.3	0	0	0	0	0	0	0	0	0.085
Fourth Embodiment 2	4.0	0	0	0	0	0	0	0	0	0.085
Fourth Embodiment -3	5.0	0	0	0	0	0	0	0	0	0.085
Fourth Embodiment -4	20.0	0	0	0	0	0	0	0	0	960'0
Fourth Embodiment 5	300	0	0	0	0	0	0	0	0	0.097
Fourth Embodiment —6	40.0	0	0	0	0	0	0	0	0	0.098

	Thickness Of	-	, ,	2 0 0 6	, c	5004	, h	1000hr	0 h r	Amount Of
	Conductor	0 0 7	1	5	1 11 /			) )		Voltage Drop
	Ratio $\alpha 1/\alpha 2$	Presence /Absence Of IC	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Voltage (V)
Fifth Embodiment -1	6.7	0	0	0	0	0	0	0	0	0.084
Fifth Embodiment -2	5.3	0	0	0	0	0	0	0	0	0.085
Fifth Embodiment -3	10.0	0	0	0	0	0	0	0	0	0000
Fifth Embodiment -4	20.0	0	0	0	0	0	0	0	0	0.094
Fifth Embodiment 5	30.0	0	0	0	0	0	0	0	0	0.095
Fifth Embodiment –6	40.0	0	0	0	0	0	0	0	0	0.097
Sixth Embodiment -1	20	0	0	0	0	0	0	0	0	0.091
Sixth Embodiment -2	3.7	0	0	0	0	0	0	0	0	0.085
Sixth Embodiment –3	5.0	0	0	0	0	0	0	0	0	0.085
Sixth Embodiment 4	30.0	0	0	0	0	0	0	0	0	0.095
Comparison Example -1	1.0	×	0	×	0	×	×	×	×	0.108
Comparison Example-2	1.0	×	0	×	0	×	×	×	×	0.108
Comparison Example-3	1.0	×	0	×	0	×	×	×	×	0.108
Comparison Example-4	1.0	×	0	×	0	×	×	×	×	0.108
Comparison Example—5	1.0	×	0	×	0	×	×	×	×	0.108
Reference Example-1	41.5	×	0	×	0	×	0	×	×	0.103
Reference Example-2	41.5	×	0	×	0	×	0	×	×	0.103
Reference Example-3	41.5	×	0	×	0	×	0	×	×	0.103
Reference Example-4	41.5	×	0	×	0	×	0	×	×	0.103
Reference Example-5	41.5	×	0	×	0	×	0	×	×	0.103

Presence/Absence Of Malfunciton Of IC Chip (O: No Malfunction, X: Malfunction) Open Yes/No (O: no open, X: open)



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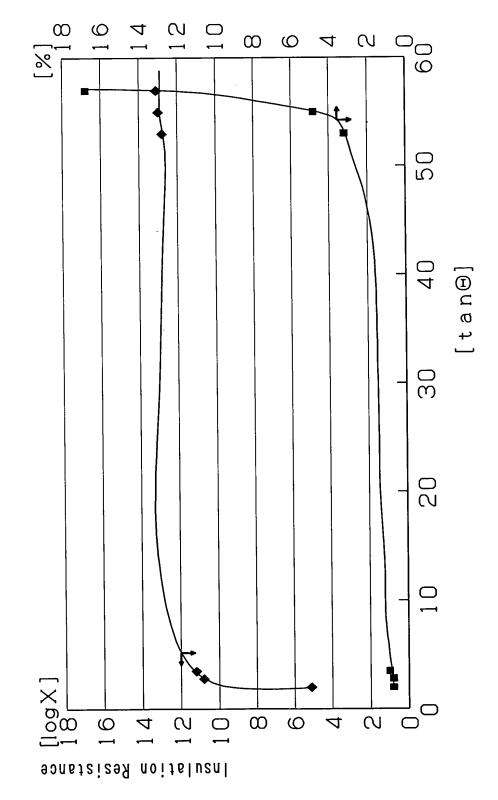
# 28/38 Fig. **28**

#	tan O	HAST(log X)	Resistance Cha nge Ratio (%)	Shape
Seventh	2	5. 1	0. 8	Rounded
Embodiment—1				Face
Seventh	2. 8	10. 8	0. 8	Rounded
Embodiment-2				Face
Seventh	3. 5	11. 2	1. 0	Rounded
Embodiment-3				Face
Seventh	53	12. 8	3. 2	Rounded
Embodiment-4				Face
Seventh	55	13. 0	4. 8	Rounded
Embodiment-5				Face
Seventh	57	13. 1	16. 8	Rounded
Embodiment-6				Face
Seventh	2. 8	_	3. 4	Linear
Embodiment-7		·		
Seventh	53	_	5. 8	Linear
Embodiment-8				
Seventh	57	_	34. 2	Linear
Embodiment-9				

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## Resistance Change Ratio



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Fig. 3(

													She																									sum of power source layers of core substrate.
	sle Test	[	2000回						1													0	0	0	0	0	0	×	×	×	×	×	×					er source laye
	Heat Cycle		1000回																			0	0	0	0	0	0	2	0	0	0	0	0					um of pow
	<b>lalfunction</b>		No.4							Yes	Yes	Yes	Yes	Yes	Yes	Yes	2	S N	No No	9	No	Yes	2	2	<u>8</u>	2	<u>گ</u>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	a
	Presence/Absence Of Malfunction	in the second	No.3	Yes	Yes	No	S	No	No	S S	No	See	No	Yes	Yes	No	No	No No	No	9	N	No	No	No	No No	%	2	2	<u>گ</u>	2	2	No.	See.	Yes	Yes	Yes	Yes	example in
	ence/At		No.2	,,	S S	No	No	No	No	9 N	%	ટ	S S	N <sub>o</sub>	S	οN	No	٩	٩	ટ	No	S S	9	S	2 2	ž	2	<u>گ</u>	S N	S N	ટ	2	ટ	Yes	Yes	Yes	Yes	rative (
	Pres		_	گ	Š	No	No	No	No	No	No	N	%	No	S	No	No	No	٩	2	No	ટ	2	_	ટ	_	$\rightarrow$	ဍ	<u>گ</u>	<u>گ</u>	ટ	ટ	ટ	Υes	Yes	Yes	Yes	compa
		,	$\tan \theta$	$1.6 \sim 2.5$	1.4~2.1	$1.4 \sim 2.1$	$1.3 \sim 1.9$	$1.3 \sim 1.9$	1.2~1.7	$3.0 \sim 10.8$	$3.0 \sim 11.0$	$3.0 \sim 11.2$	$2.8 \sim 11.2$	$2.7 \sim 11.0$	$2.7 \sim 11.4$	$3.0 \sim 5.3$	$3.1 \sim 5.4$	$3.1 \sim 5.4$	$2.7 \sim 5.5$	2.9~5.7	2.7~5.7	$4.2 \sim 10.8$	<b>≀</b> l	$3.8 \sim 11.0$	$3.7 \sim 11.2$	$3.7 \sim 11.4$	$3.7 \sim 11.3$	4.0~10.8	4.0~10.8	7	$3.7 \sim 11.2$	$3.8 \sim 11.4$	$3.7 \sim 11.4$	$1.6 \sim 2.5$	$3.0 \sim 10.8$	$3.0 \sim 5.3$	$4.2 \sim 10.8$	he eighth
က် က်		Shape Of	Taper	$\neg$	45 Rounded Face	60 Rounded Face	100 Rounded Face	125 Rounded Face	150 Rounded Face				ded Face	125 Rounded Face	150 Rounded Face	Face	Face	Face		$\neg$			Face			Face	ed Face		45 Linear		Linear	Linear	150 Linear	Rounded Face	Rounded Face	Rounded Face		n inner layer of the eighth comparative example indicates
		Thickness Of Conductive Layer	In Inner Layer	30	45	09	100	125	150	30	45	09	100	125	150	30	45	09	100	125	150	30	45	09	100	125	150	30	45	60	100	125	150	15*	15*	15*	15*	ness of conductor
			Embodiment	Eighth Embodiment-1	Eighth Embodiment-2	Eighth Embodiment-3	Eighth Embodiment-4	Eighth Embodiment-5	Eighth Embodiment-6	Eighth Embodiment-7	Eighth Embodiment-8	Eighth Embodiment-9	Eighth Embodiment-10	Eighth Embodiment-11	Eighth Embodiment-12	Eighth Embodiment-13	Eighth Embodiment-14	Eighth Embodiment-15	Eighth Embodiment-16	Eighth Embodiment-17	Eighth Embodiment-18	Eighth Embodiment-19	Eighth Embodiment-20	Eighth Embodiment-21	Eighth Embodiment-22	Eighth Embodiment-23	Eighth Embodiment-24	Eighth Embodiment-25	Eighth Embodiment-26	Eighth Embodiment-27	Eighth Embodiment-28	Eighth Embodiment-29	Eighth Embodiment-30	mple-1		П	Γ	].≌

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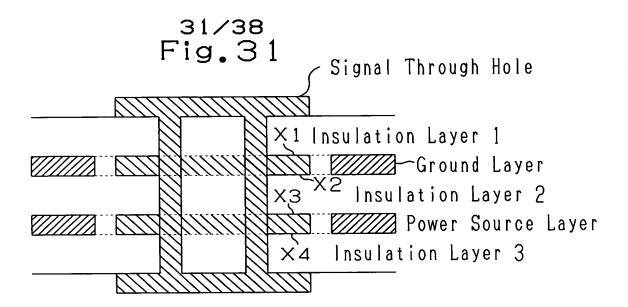


Fig. 32

						- ,					1	ı	<del>- T</del>	т		
Result After HAST Test	0	0	0	0	0	0	0	0	0	0	×	×	0	0	0	0
Amount Of Voltage Drop (V)	0.091	0.093	0.085	0.085	0.095	0.097	0.087	0.086	0.084	0.083	60.0	0.093	0.084	0.108	0.103	0.123
Sum Of Thicknesses Of Power Source Layers Of Core (µm)	40	24	09	75	615	815	09	75	65	165	190	215	140	50	840	1015
Thickness Of Power Source Layer In Inner Layer Of Core Substrate (µm)	25	15	45	09	100	100	15	15	20	150	175	200	125	10	100	100
Thickness Of Power Source Layer On The Front Surface Of Core Substrate (µm)	15	6	15	15	15	15	45	90	15	15	15	15	15	01	40	15
Thickness Of Conductive Layer On Interlayer Insulation Layer (µm)	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	50
Quantity Of Inner Layers	2	2	2	2	12	16	2	2	2	2	2	2	2	2	16	70
α1/ α2	2	1.2	3	3.75	30.75	40.75	က	3.75	3.25	8.25	9.5	10.75	7	-	42	50.75
#	Ninth Embodiment — 1	Ninth Embodiment—2	Ninth Embodiment—3	Ninth Embodiment—4	Ninth Embodiment — 5	Ninth Embodiment—6	Ninth Embodiment—7	Ninth Embodiment — 8	Ninth Embodiment — 9	Ninth Embodiment — 10	Ninth Embodiment—11	Ninth Embodiment — 12	Ninth Embodiment—28	Ninth Comparison Example — 1	Ninth Comparison Example — 2	Ninth Comparison Example — 3

Fig. 33

	α1/	Quantity	Thickness	Thickness Of	Thickness Of	Sum Of	Amount	Presence/	Presence/Absence Of Malfunction	<b>Nalfunction</b>
	α2	Of Inner	ಕ	Power Source	Power Source	Thicknesses	ъ	7.	14.	Marian
	1	Layers	Conductive	Layer On The	Layer In Inner	Of Power	Voltage	Mounting 7.1.7.	Mounting of No.	Mounding of No.3 IC
4			Layer On	Front Surface	Layer Of Core	Source Layers	Drop	0 100	01 7:001 10	0 140.0
ŧ			Interlayer	Of Core	Substrate (µm)	Of Core	S			
			Insulation	Substrate		(mn)				
			Layer (µm)	(മ്പ)						
Ninth Embodiment — 1	2	2	20	15	25	40	0.091	8	Yes	Yes
Ninth Embodiment—2	1.2	2	20	6	15	24	0.093	N	Yes	Yes
Ninth Embodiment — 3	က	2	20	15	45	09	0.085	&	8	2
Ninth Embodiment—4	3.75	2	20	15	90	75	0.085	R	8	2
Ninth Embodiment—5	30.75	12	20	15	100	615	0.095	2	Yes	Yes
Ninth Embodiment—6	40.75	16	20	15	100	815	0.097	₽	Yes	Yes
Ninth Embodiment—7	က	2	20	45	15	09	0.087	₽	2	Yes
Ninth Embodiment — 8	3.75	2	8	99	15	75	0.086	2	2	Yes
Ninth Embodiment — 9	3.25	2	20	15	20	65	0.084	2	2	2
Ninth Embodiment — 10	8.25	2	20	15	150	165	0.083	2	2	Yes
Ninth Embodiment — 11	9.5	2	20	15	175	190	60'0	No	Yes	Yes
Ninth Embodiment—12	10.75	2	20	15	200	215	0.093	2	Yes	Yes
Ninth Embodiment—27	4	4	20	15	32.5	80	0.087	8	2	Yes
Ninth Embodiment—28	7	2	20	15	125	140	0.084	2	2	2
Ninth Comparison	-	2	20	9	01	70	0.108	Yes	Yes	Yes
Example — 1										
Ninth Companison Example — 2	45	16	20	40	100	840	0.103	Yes	Yes	Yes
Ninth Comparison Example — 3	50.75	20	8	15	100	1015	0.123	Yes	Yes	Yes

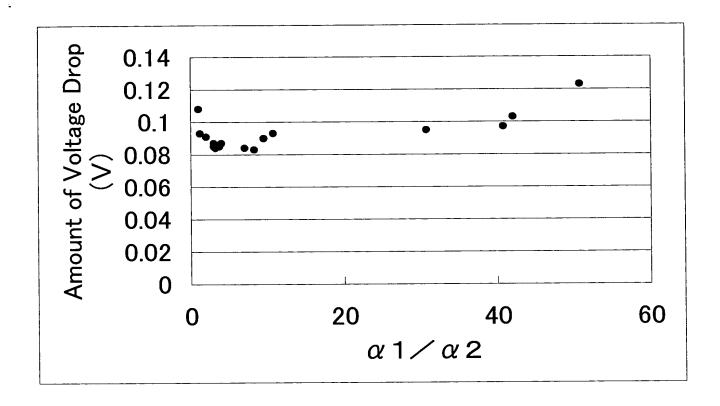
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Fig. 34

	Co	onductor Width/	Interval Betwe	en Conductors (μι	n)
#	5/5	7. 5/7. 5	10/10	12. 5/12. 5	15/15
Ninth Embodiment-3	0	0	0	0	0
Ninth Embodiment-4	0	0	0	0	0
Ninth Embodiment-7	×	×	0	0	0
Ninth Embodiment-8	×	×	0	0	0

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35/38 Fig. 35



				Thickness	Thickness	Thickness	Sum Of	Presence/	Presence/Absence Of Malfunction	Aalfunction
	- 5	Š	Quantity	Of Conductive	Of Power Source	Of Power Source	Thicknesses Of Power	Mounting of No.1 IC	Mounting of No.2 IC	Mounting of No.3 IC
##	σ,	dummy	ъ.	Interlayer	The Front	Layer in Inner Laver	Source Lavers Of			·
:	8	and H	inner	Insulation	Surface Of	Of Core	Core			
		?	3	Layer (µm)	Core Substrate (um)	Substrate (µm)	(mnl)			
Ninth Embodiment—13	က	25	2	20	15	45	09	No	No	No
Ninth Embodiment — 14	က	100	2	20	15	45	09	No	%	%
Ninth Embodiment—15	3.25	8	2	20	15	20	65	No	No	2
Ninth Embodiment — 16	3.25	100	2	20	15	50	65	No	No	2
Ninth Embodiment—17	3.75	20	2	20	15	09	75	No	S.	2
Ninth Embodiment — 18	3.75	100	2	20	15	09	2/2	No	%	2
Ninth Embodiment — 19	8.25	50	2	20	15	150	165	N <sub>o</sub>	R	2
Ninth Embodiment—20	8.25	100	2	20	15	150	165	N	8	2
Ninth Embodiment—21	9.5	20	2	70	91	175	190	8	2	Yes
Ninth Embodiment—22	9.5	100	2	20	15	175	190	2	2	Yes
Ninth Embodiment—23	10.75	20	2	20	15	200	215	2	2	Yes
Ninth Embodiment—24	10.75	100	2	20	15	200	215	2	2	Yes
Ninth Embodiment – 25	3	20	2	20	45	15	09	2	2	Yes
Ninth Embodiment—26	3	100	2	20	45	15	09	2	2	Yes

Fig. 36

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Embodiment	Thickness Of Conductive Layer In Inner Layer	Shape Of Taper	an heta	no-dummy land TH%	Presence/Absence Of Malfunction No.4
Tenth Embodiment-1	45	Rounded Face	3.1~5.4	50	No
Tenth Embodiment-2	60	Rounded Face	3.1~5.4	50	No
Tenth Embodiment-3	100	Rounded Face	2.7 <b>~</b> 5.5	50	No
Tenth Embodiment-4	125	Rounded Face	2.7~5.7	50	No
Tenth Embodiment-5	150	Rounded Face	2.9 <b>~</b> 5.7	50	No
Tenth Embodiment-6	45	Rounded Face	3.1 <b>~</b> 5.4	100	No
Tenth Embodiment-7	60	Rounded Face	3.1~5.4	100	No
Tenth Embodiment-8		Rounded Face	2.7~5.5	100	
Tenth Embodiment-9		Rounded Face	2.7~5.7	100	No
Tenth Embodiment-10		Rounded Face	2.9~5.7	100	No
Tenth Embodiment-11		Rounded Face	4.0~11.0		No
Tenth Embodiment-12		Rounded Face	3.8~11.0		No
Tenth Embodiment-13		Rounded Face	3.7~11.2		No
Tenth Embodiment-14		Rounded Face	3.7~11.4		No
Tenth Embodiment-15		Rounded Face	3.7~11.3		No
Tenth Embodiment 16		Rounded Face	4.0~11.0		No
Tenth Embodiment-17		Rounded Face	3.8~11.0		No
Tenth Embodiment-18		Rounded Face	3.7~11.2		No
Tenth Embodiment-19		Rounded Face	3.7~11.4		No
Tenth Embodiment-19		Rounded Face	3.7~11.3		No
Lieuri Filipogiment 50	1.00	11 400	10.7 11.0	100	1

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Fig.38

